602. SCIENCE STANDARDS - GRADE 5, SECTIONS 603 THROUGH 613.

The samples associated with the content standards are meant to illustrate meaning and to represent possible areas of applications. They are not intended to be an exhaustive list, but are samples of applications that would demonstrate learning.

603. UNIFYING CONCEPTS OF SCIENCE.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand systems, order, and organization.	a. Know that a system is an organized group of related objects that form a whole.	i. Using a clear plastic container, create a biome using soil, plants, and earthworms.
	b. Describe the function of each human body system.	i. Diagram the respiratory system. ii. Sample systems: muscular, digestive, circulatory, weather, bicycle, etc.
02. Understand concepts and processes of evidence, models, and explanation.	a. Know that observations and data are evidence on which to base scientific explanations and predictions.	i. Compare biomes with different variables such as light, temperature, water. ii. Compare and graph a resting heart rate against a heart rate after exercise.
	b. Know the difference between observations and inferences.	i. Use happy/sad balls to determine the differences between observation and inference. ii. During a science experiment, discuss the difference between observation and inference.
	c. Use models to explain or demonstrate a concept.	i. Create a balloon model using a plastic cup, straw, fastener, and balloons and explain the respiratory system.
	d. Develop skills to create scientific explanations based on scientific knowledge, logic, and analysis.	
03. Understand constancy, change, and measurement.	a. Recognize that some concepts in science do not change with time.	i. Create a straight track with a steady decline, marking the midpoint. Roll a marble and measure the speed from the beginning to the midpoint and midpoint to the end. Compare acceleration rates.
	b. Analyze changes that occur in and among systems.	i. Create a system of ice water. Measure the temperature. Add a variable such as rock salt and compare the temperatures. ii. Measure the temperature of water in different colored containers over time.
	c. Measure using standard and metric systems with an emphasis on the metric system.	i. Measure various objects (temperature, volume, weight, length) using both metric and customary systems.
04. Understand the theory that evolution is a process that relates to the gradual changes in the universe and of	a. Understand the relationships of past, present, and future.	i. Create and demonstrate an erosion model with sand, gravel, humus, and dirt before and after addition of vegetation and other soil components.

equilibrium as a physical state.		
05. Understand concepts of form and function.	a. Understand that the shape or form of an object or system is frequently related to its use or function.	i. Study the form and function of bicycles or clocks.

604. CONCEPTS OF SCIENTIFIC INQUIRY.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand scientific inquiry and develop critical thinking skills.	a. Develop questions that can be answered by conducting scientific experiments.	i. How does the length of plastic straw kazoos affect pitch? Hypothesize.
	b. Conduct scientific investigations using controls and variables when appropriate.	i. Build a straw kazoo by flattening one end and cutting it into to a v-shape. ii. Conduct an experiment to test several different lengths of kazoos.
	c. Select and use appropriate tools and techniques to gather and display data.	i. Measure and record lengths of kazoos. ii. Make a human graph in order of the lengths of the kazoos. Verify that pitch differences are consistent with the lengths. iii. Tape kazoos in order of length to create three-dimensional graph representing relationship to pitch.
	d. Analyze data in order to develop descriptions, explanations, predictions, and models using evidence.	i. Develop an explanation why straw length determines the pitch.
	e. Develop a hypothesis based on observations.	i. Draw conclusions from individual or class data.
	f. Compare alternative explanations and predictions.	i. Discuss and recognize other possible variables.
	g. Communicate scientific procedures and explanations.	i. Have class present data to a music teacher in written or oral form. Present data to the class in a meaningful way.

605. CONCEPTS OF PHYSICAL SCIENCE.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the structure and function of matter and molecules and their interactions.	a. Explore and describe the differences among elements, compounds, and mixtures.	i. Provide samples of different elements (lead, carbon, sodium, chlorine) for student observation. ii. Show different types of compounds (sodium chloride, water) and describe physical differences. iii. Have students create their own mixtures.
	b. Explore and calculate properties of matter.	i. Determine the density of several objects.

	c. Compare differences among solids, liquids, and gases using the concept of density: explore the effect of temperature on density.	i. Present three liquids, three solids, and three gases and compare properties.
	d. Understand the nature of physical change and how it relates to physical properties.	i. Discuss properties of butter. Change the butter by cutting and then heating. Observe properties at each state.
02. Understand chemical reactions.	a. Observe and know that substances react with each other to form new substances with different properties.	i. Baking soda and vinegar in bottle with expanding balloon activity.
03. Understand concepts of motion and forces.	a. Observe the effects of different forces (gravity and friction) on the movement, speed, and direction of an object.	i. Using a variety of inclined planes and surfaces, determine the speed of several objects and graph the results.
	b. Investigate different forms of energy.	i. Make an electromagnet.

606. CELLULAR AND MOLECULAR CONCEPTS.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the cell is the basis of form and function for all living things and how living things carry out their life functions.	a. Explore the different structural levels of which an organism is comprised: cells, tissues, organs, organ systems, and organisms.	i. Observe objects under a microscope such as onionskin or cheek scrapings.
	b. Recognize the structural differences between plant and animal cells.	i. Diagram a plant and animal cell and label. ii. Create a Venn diagram that shows the similarities and differences.
	c. Explore the concept that traits are passed from parents to offspring.	i. Collect and graph eye color data of family members and compare with own and graph.

607. INTERDEPENDENCE OF ORGANISMS AND BIOLOGICAL CHANGE.

Interdependence of Organisms and Biological Change standards do not apply at this grade level.

608. MATTER, ENERGY, AND ORGANIZATION IN LIVING SYSTEMS.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the relationship between matter, energy, and organization to trace matter as it cycles and energy as it flows through living systems and between living systems and the environment.	a. Know that the energy for life is primarily derived from the sun through photosynthesis.	i. Plant grass in small container. Put some grass in the dark and some in the sunlight. Compare results.

609. EARTH AND SPACE SYSTEMS.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand scientific theories of origin and subsequent changes in the universe and earth systems.	a. Investigate the interactions between the solid earth, oceans, atmosphere, and organisms.	i. Research topics: pollution, oceans affect on climate, global warming, weather, plate tectonics or continental drift.
	b. Know the water cycle and its relationship to weather and climate.	
	c. Identify cumulus, cirrus, and stratus clouds and their relationship to weather changes.	
	d. Know that fossils are evidence of past life forms.	i. Make a fossil out of Plaster of Paris. ii. Given a fossil, create a story about how it came to be (leaf, dinosaur bone, sea shells). iii. Field trip to a fossil bed or museum (Hagerman).
02. Understand geo-chemical cycles and energy in the earth system.	a. Know the rock cycle and identify the three classifications of rocks.	i. Create an informational book explaining the rock cycle.
	b. Know the layers and composition of the earth.	

610. TECHNOLOGY.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the relationship between science and technology and develop the abilities of technological design and application.	a. Know that science and technology are human endeavors interrelated to each other, to society, and to the work place.	i. Interview a professional such as a doctor, a farm mechanic, or computer tech and ask them to explain how they use science and technology in their field.
	b. Compare scientific inquiry and technological design in terms of activities, results, and influences on individuals and society: know that science enables technology and vice versa.	i. Identify modifications of an everyday object (car, toothbrush, tennis shoe) and explain how science has aided in its evolution.
	c. Create a tool to perform a specific function.	
	d. Use available and appropriate technology.	

	e. Explore the elements of technological design, which include the following: - Identify a problem; - Propose a solution; - Implement a proposed solution; - Evaluate the solution and its consequences; - Communicate the problem, process, and solution.	i. Using a mousetrap, design a contraption that will extinguish a candle from 10 feet away.

611. PERSONAL AND SOCIAL PERSPECTIVES.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand common environmental quality issues, both natural and human induced.	a. Identify issues for environmental studies.	i. Research an environmental issue and describe its impact on the United States.
02. Understand the causes and effects of population change.	a. Understand the effect of technological development and human population growth on the United States and/or the world.	i. Compare and contrast pictures of your city today and ten years ago. ii. Compare and contrast the differences in the United States. iii. Take a field trip to the local sewage treatment center or water treatment plant. iv. Clean up the schoolyard, park or waterway.
03. Understand the importance of natural resources and the need to manage and conserve them.	a. Understand the differences between renewable and nonrenewable resources.	i. Separate lunchroom trash into renewable and nonrenewable resources.
	b. Understand the conservation of natural resources.	i. Compare and contrast the different forms of transportation and their impact on natural resources, for instance, public transportation, automobiles, bicycles.
04. Understand different uses of technology in science and how they affect our standard of living.	a. Identify examples of technologies used in these scientific fields: - Food production; - Environmental cleanup; - Advances in medicine; - Communications; - The space program; - Weather forecasting.	

612. HISTORY OF SCIENCE.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand the significance of major scientific milestones.	a. Understand major contributions of various scientists and researchers.	i. Choose a scientist from a topic studied this year and explain how their contribution was significant to society.

613. INTERDISCIPLINARY CONCEPTS.

Standard - The student will:	Content Knowledge and Skills:	Samples of Applications:
01. Understand that interpersonal relationships are important in scientific endeavors.	a. Work in teams to solve problems.	i. Work in cooperative teams to solve problems. ii. Given a problem, students attempt to solve individually then solve the same problem in groups. Compare results.
02. Understand technical communication.	a. Read, understand, and follow technical instructions.	i. Follow instructions to build a compound machine.
	b. Write a lab report.	